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AUTHOR	Cain, Glen G.
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ABSTRACT

In this review, benefits are equated with the impact of the Job Corps on increasing earnings of the Corpsmen above what their earnings would have been in the absence of the program. Earning improvements are measured in two alternative ways: (1) the educational gains achieved in the Job Corps in conjunction with education and life-time earnings, and (2) comparison of wages earned by ex-Corpsmen with the wages of a comparable group of youth who had no Job Corps experience. Net costs of the average five-month Job Corps experience is estimated at $3500 and this figure includes an allowance for the overhead expenses of Job Corps and for the earnings foregone by the Corpsmen during their training. Appraised value of work projects is subtracted from costs and, finally, the value of transfer payments made to Corpsmen is deducted. Analysis is supported by a technical discussion of source materials and procedures used to manipulate data. (KG)

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BENEFIT/COST ESTIMATES FOR JOB CORPS

Glen G. Cain

Department of Economics and
Institute for Research on Poverty
University of Wisconsin, Madison
Wisconsin

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Discussion Papers

Preface

This paper was written for distribution within the Office of Economic Opportunity, to other governmental agencies, and to other interested persons or organizations. Because of the variety of backgrounds and professions of persons who might read this paper, I have divided it into three parts: Part I (pp. 2-4 plus a two-page appendix) gives an overview of the analysis and is aimed at the non-economist; Part II (pp. 5-18) is the heart of the paper, giving both a complete statement of the principal findings and a summary of the methods used in the analysis; Part III (pp. 18-48) is a technical discussion which indicates the source materials used and the procedures employed to manipulate the data. This last part is addressed to the research technician.

There are a few minor changes in this version of the study compared to an earlier one (dated May 22, 1967). The most noticeable change is a new set of benefit/cost ratios which reflect new computations of present values of the estimated gains from educational advancement. These computations are both easier to describe and more exact; the approximations used before were timesaving but were difficult for many readers to follow. It should be emphasized, however, that the revised benefit/cost ratio resulting from the new, more precise benefit measures are so similar to the old ratios that no substantive matters are altered.

I wish to express my gratitude for many helpful comments and support to the staff of the Research and Plans Division of OEO and especially to Robert A. Levine, Director, and Robinson G. Hollister, Chief, and Anthony Dater, who provided able research assistance. I am also indebted to Robert Krug and Neil Tierney of the Job Corps Division of OEO for their assistance and to Vartkes Broussalian and David Page of the Bureau of the Budget for their helpful comments.

I The Role of Benefit/Cost in Evaluating Job Corps

The question examined in this study is, Does the investment in Job Corps pass the economic test of efficiency? Alternatively, we ask, Does the program earn a rate of return at least equal to some average rate earned by other private and governmental investments? The best simple answer to this question that this study offers is "yes," but there are a number of qualifications that go along with this favorable verdict.

First of all we should emphasize that there are important issues of equity which may well take precedence over efficiency considerations. We need, however, to have some basis for assessing the efficiency of any program even though this is not its primary justification. If, for example, we decide that it would be equitable for one group to pay for benefits given to another group, we should ask which means of attaining some given level of benefits is cheapest (or, alternatively, for the given level of expenditures, which methods yield the most benefits).

As one step in the benefit/cost approach to these questions a ratio of benefits to costs is computed, and we determine whether the ratio is larger or smaller than those of alternative uses of the funds. The benefit/cost ratio of one (B/C = 1) is a convenient benchmark for evaluation,since we can determine at a glance whether the program is preferable, on efficiency grounds, to the simplest alternative of a transfer payment. If none of the programs yields a benefit/cost ratio of one, we must then face up to the question of whether the equity (or, perhaps, political) arguments for the nontransfer method are worth their extra costs.

When the ratio is greater than one, we should consider the question

of increasing the investment in the program. Although to answer this question there are procedures for evaluating investments that are sharper than the benefit/cost method--procedures that focus on the rate of return or on the amount of the present value of the investment--the mere fact that the benefits exceed the cost gives us a signal that we can profitably make further investments in the program. The present evaluation of Job Corps gives us this signal.

Clearly, the computation of a benefit/cost ratio, by itself, requires nothing m o r e than elementary arithmetic, and the substance of the evaluation lies in how we measure the benefits and costs. The following key assumptions and restrictions underlie the measurements made in this study:

1. The impact of Job Corps on increasing the earnings of the Corpsmen above what their earnings would have been in the absence of the program is the sole measure of benefits used. No allowance is made for any benefits that stem from general improvements in civic behavior, lower crime rates, more stable family relationships, better upbringing of the children they w i l l have, or other such hard-to-measure consequences of a youth's experience in Job Corps. Although the measure of benefits that is used--earnings improvement--is likely to be positively correlated with these other benefits, its total size will be understated, and we should look upon the benefit/cost ratios as lower bounds on the "true" ratios.

2. Two alternative measures of earnings improvement are used. One is based on the educational gains achieved in Job Corps in conjunction with the relation between education and lifetime earnings that have been estimated in the best statistical studies available. Using conservative discount rates to translate expected future earnings into present values, the estimated present value of the improvement in lifetime earnings for t h e <u>average</u> Corpsman (<u>who is in the program about five months</u>) is between $3,600 and $5,900. The second measure of earnings improvement is based on a direct comparison of wages currently earned by ex-Corpsmen with the wages of a comparable group of youth who had no Job Corps experience. The present value of this earnings differential (in favor of

Job Corps) is $5,100. Other values of both measures of earnings improvement are also computed in Part II, but the figures given here are offered as the most appropriate estimates. Keep in mind that the educational data and the wage data are alternative ways of measuring the same thing--the gain in expected lifetime earnings. We can use one or the other, but the two should not be added.

3. The net costs of the average Job Corps experience for a youth (again based on a five-month stay) is estimated to be about $3,500. Benefit/cost ratios that are larger than unity

$$\text{e.g., } \frac{\text{benefits} = 3{,}600}{\text{costs} = 3{,}500} > 1$$

follow directly from these costs and the benefit figures discussed in point 2.

4. The costs include an allowance for the overhead expenses of Job Corps and for the earnings foregone by the Corpsmen during the time spent in Job Corps. The appraised value of the work projects performed at the conservation centers are subtracted from the costs. Finally, the value of transfer payments made to the Corpsmen (and their parents) are deducted from the costs. Transfer payments are not included because they do n o t require any net increase in resource use; rather they involve expenditures on consumption that would be spent if there were no programs: the Corpsmen eat meals at the center (at the taxpayers' expense) instead of meals at home; they spend their allowance on various commodities and taxpayers buy fewer commodities; and so on. The transfer payments are highly relevant to the question of who is picking up the tab on the program, but not to the question of what is the rate of return on the program. The situation is analogous to that involved in decisions about expenditures on the training of physicians: One question is,What is the return on the investment? Separate questions are,Who should pay the costs?and Who should capture the returns?

These four points indicate the basic assumptions behind, and the limitations of, the measurements made of benefits and costs of Job Corps. Perhaps the most questionable assumption is that transfer payments made to the Corpsmen are not part of the net costs of the program. A brief defense of this viewpoint is presented in the Appendix (pp. 49-50). The next section explains the benefit/cost analysis in greater detail.

II A Summary of the Results

A number of benefit/cost ratios for Job Corps are reported in this paper. Different assumptions about the appropriate concepts and measures of the costs and benefits lead to ratios that range between .60 and 1.89. The interval from 1.02 to 1.70 is suggested as encompassing a set of ratios that are conservative and realistic. An important limitation of this study is that the sole measure of benefits is the improvement in labor market earnings of the Corpsmen. Given the constraints imposed by the data the measure of benefits should be considered, therefore, as a lower bound.

Two sources of data are used for measuring the benefits from Job Corps. One is the report of gains in reading and mathematics by Corpsmen [1].[1] A careful study of the relation between earnings and education by Giora Hanoch [2] provides a basis for translating the educational gains into expected future lifetime earnings.

The second data source consists of two surveys conducted in February 1967 of: 1) a sample of ex-Corpsmen who left Job Corps during August 1966 [3], and 2) a sample of applicants who were accepted for Job Corps but who did not participate in the program [4]. The latter are referred to as "No-Shows." Part of the "No-Shows" decided during 1966 not to enter Job Corps, and thus their average exposure to the labor market was probably only a few weeks longer than that of the ex-Corpsmen in the first sample. These "late No-Shows" comprise the group with which the ex-Corpsmen are compared in terms of the median wage rates earned as of

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[1] The references are numbered in brackets and are listed on the last page of this paper.

the survey date (February 1967).

The advantage of the evaluation based on educational gains is that we get a longer-run measure of the benefits from the Job Corps experience, if we assume that the reported gains are permanent and not subject to fadeout (or, more precisely, not subject to a fadeout that is any greater than that which generally applies to schooling). The weakness of this measure is that nationwide data from the 1960 Census are used as a basis for the education-earnings relation, and we cannot be sure that this applies precisely to the youth in Job Corps, even though we have adjusted the data to this end.

The advantages of the wage comparisons obtained from the Harris surveys are twofold . One is the availability of a direct measure of earnings. The second is the likelihood that the control group is similar to the study group in terms of their characteristics and also with respect to the time and circumstances of their recent labor market experiences.[2] The weakness of the wage comparison is that the moment-in-time observation may not accurately reflect the longer-run earnings performance of the youth.

The cost figures that are used are comprehensive and measure the

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[2]See Table 10 in Part III of this paper for a comparison of several measured characteristics of the samples of "No-Shows" and Corpsmen. Based on this table, one is hard pressed to predict which of the two groups is more likely to succeed in the labor market. Regarding the unmeasured personal characteristics, it is difficult to say a priori whether the "No-Shows" are better or poorer candidates for success than the Corpsmen. The fact of not showing may reveal a lack of motivation that indicates the "No-Shows" would be poor workers. On the other hand, many young people turn to Job Corps in desperation after repeated failures in school, home, and the job market. Since many of the "No-Shows" stayed out of Job Corps <u>because</u> they found a job, this suggests that they are better equipped in the labor market than the youths who entered Job Corps.

different costs of varying average durations in the Job Corps. Nine months is the normal term for graduation, and five months is the estimated average stay for all Corpsmen--graduates and dropouts combined. More recent data shows a six-month average stay. We may assume that the per-Corpsman man-year costs will fall as the rate of capacity utilization in the Job Corps centers rises, and longer average stays will generally increase the utilization rate. The cost figures shown in Table 1 below reflect the higher per-Corpsman costs of the shorter duration periods.[3] (The effect of duration on benefits is discussed on page 14.)

With this background on the bases for measuring benefits and costs, the reading of Table 1 below is straightforward. Panel A shows the cost figures. The reported statutory costs, adjusted for months in Job Corps, are given in column I. In columns II and III the capital and administrative overhead costs have been added. Transfer payments (both money and income-in-kind in the form of food and clothing) have been deducted for the amounts in column IV. In column V the estimated foregone earnings are added to the costs. Finally, the appraised value of the work projects performed at the conservation centers is subtracted to measure the net costs, which are given in column VI, and these approximate the total "real-resource" costs per Corpsmen, per term of stay.

There are five columns in Panel B. Column V on the far right of the page shows the value of the wage gains attributable to the Job Corps experience. The post-Corps wages are not only higher than the pre-Corps

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[3] See Tables 2-4 in Part III for the cost data obtained from Job Corps and a discussion of the handling of "fixed" and "variable" costs of operating Job Corps.

TABLE 1

Estimated Costs and Benefits and B/C Ratios

PANEL A: ESTIMATES OF COST

Months in Job Corps	Reported Statutory Costs[a]	(1) Including Capital Costs[b]	(2) Including Administrative Costs Outside the Centers[c]	(3) Excluding Transfer Payments[d]	(4) Plus Foregone Earnings[e]	(5) Minus Value of Work Projects[f]
	I	II	III	IV	V	VI
12	$7,142	$7,840	$8,443	$6,513	$8,123	$7,490
9	5,414	5,946	6,406	4,958	6,137	5,662
6	3,802	4,185	4,517	3,552	4,320	4,003
5	3,300	3,639	3,932	3,128	3,772	3,508

[a] Costs of operating centers excluding capital costs (see pp. 18-23).

[b] $698 per Corpsmen for 12 months (see pp. 23&24). Thus column II, row 1 = $7142 + $698 = $7840.

[c] $603 per Corpsmen for 12 months (see p. 23).

[d] $1,930 per Corpsmen for 12 months, which covers food, clothing, and allowances (see p. 23). Also see Appendix A, pp. 49-50.

[e] $1,610 per Corpsmen for 12 months. Estimates of the earnings the Corpsmen could have made during the time spent in Job Corps (see pp. 25-27).

[f] $633 per Corpsmen for 12 months (see p. 27).

NOTE: A full discussion of the footnotes in this table is given in Part III.

TABLE 1

Estimated Costs and Benefits and B/C Ratios (Continued)

PANEL B: ESTIMATES OF BENEFITS (Present Values*)

Months in Job Corps and Discount Factor	Educational Gains[g]				Wage Gains[l]
	White/South Index[h]		Total Index[h]		All Corpsmen Compared to the "Late" No-Show Group[m]
	6-8[i]	8-10[i]	6-8[i]	8-10[i]	
	I	II	III	IV	V
9 months:					
3%[j]	$7,716	$10,706	$6,448	$7,883	
5%	4,982	7,187	3,964	5,438	
5 months:					
3%[j]	4,288	5,949	3,583	4,380	$5,124
5%	2,768	3,994	2,203	3,022	3,666
Special calculations based on an exponential rate of education achievement--i.e., starts slow and gains more rapidly in the final months.[k]					
6 months:					
3%	4,961	6,884	4,146	5,068	
5%	3,203	4,621	2,549	3,496	
5 months:					
3%	4,079	5,660	3,409	4,167	
5%	2,636	3,799	2,096	2,875	

*The stream of benefits (in the form of future earnings improvements) needs to be discounted by some interest rate to make it comparable to the costs, which are incurred "now." The present value of benefits gives the total expected earnings improvement after applying a discounting factor.

[g]Valuation of gains in Corpsmen's education achievement (see pp. 28-29).

[h]Index based on data for white Southern males or on all males (see pp. 29-37).

[i]Assumed grade intervals over which the gains are made (see pp. 37-39).

[j]Rate used to discount future earnings (see * note above and pp. 39-42).

[k]See pp. 14 and 42-43.

[l]Wage gains of Corpsmen reported in survey (see pp. 44 and 45).

[m]Late "No-Shows" are an assumed control group (see pp. 44 and 46-48).

NOTE: A full discussion of the footnotes in this table is given in Part III.

TABLE 1

Estimated Costs and Benefits and B/C Ratios (Continued)

PANEL C: BENEFIT/COST RATIOS (Obtained by matching each cell in Panel B with the column VI cost estimates in Panel A)

Row	Costs Based on Months in Job Corps, and Discount Factor	Educational Gains				Wage Gains
		White/South Index		Total Index		
		6-8	8-10	6-8	8-10	
	9 months:					
1.	3%	1.36	1.89	1.14	1.39	
2.	5%	.88	1.27	.70	.96	
	5 months:					
3.	3%	1.22	1.70	1.02	1.25	1.45
4.	5%	.79	1.14	.63	.86	1.04
	Special calculations using the earnings increases based on an exponential rate of educational achievement--i.e., starts slow and gains more rapidly in the final months.					
	6 months:					
5.	3%	1.24	1.72	1.04	1.27	
6.	5%	.80	1.15	.64	.87	
	5 months:					
7.	3%	1.16	1.61	.97	1.19	
8.	5%	.75	1.08	.60	.82	

wages, but are higher (by about 12 cents per hour) than the control group of "No-Shows." A conservative method of extrapolating these wage gains yields the amounts $5,124 and $3,666. The average stay in Job Corps of the ex-Corpsmen surveyed was five months.

The first four columns of Panel B give varying estimates of the present value of the increases in lifetime earnings attributable to the educational gains made in Job Corps. Information is available in the Hanoch study on the earnings of four region-color groups (whites and nonwhites living in the North and South) and eight educational groups. Which groups are to be chosen to represent the Job Corps youth? The first decision is which region-color group or groups to use. One choice was an unweighted average of all four region-color groups, which approximates the actual racial and regional composition of Job Corps. This data base gives us the "Total Index" in Table 1. The chief difficulty with this basis is that the data for nonwhites are believed to be unreliable because of large response and measurement errors.

We could restrict our data base to whites and thereby gain accuracy in the estimates, but this procedure sacrifices relevancy to the Job Corps population. A compromise which was adopted was to work with the data for whites living in the South. The large sample size guarantees accurate estimates of the characteristics studied, and at the same time the South's lower quality schooling and lower paying job markets provide us with conditions that are closer to those that face the Job Corps youth. The earnings obtained by using the "White/South" data base were adjusted downward to take account of the proportion of Corpsmen who are nonwhite. (See Part III for further discussion of these procedures.)

The second issue in selecting groups to represent the Job Corps population is which education levels to use. As shown in Table 1, two grade intervals were selected over which to apply the equivalent educational gain of 1.625 years achieved by a nine-month stay in Job Corps. The interval between the 8th and 10th grades matches the years of schooling completed by the Corpsmen, which is about nine. The interval between 6th and 8th grades moves closer to the actual level of educational achievement of the youth, which is at about the 5th grade level.

For both measures of earnings improvement--educational gains and wage gains (which were discussed above)--discount rates of 3 and 5 percent were used to calculate present values. If a 5 percent rate is accepted as the conventional discount factor, then a modest 2 percent growth rate in earnings over the future working careers of both Corpsmen and non-Corpsmen justifies the use of a 3 percent rate.[4] If a higher discount rate is considered appropriate--say 7 percent--then an assumed 2 percent growth rate permits us to use 5 percent in the calculations.

The benefit/cost ratios in Panel C are computed directly from Panels A and B. The ratios for the nine-month stays may be looked upon as those that could be achieved if dropout rates and under-utilization of facilities were diminished. The ratios for five months reflect the actual past performance of the Job Corps centers, and those for six

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[4] A 5 percent discount rate is higher than those customarily used in evaluating government investment projects (although even higher rates could be advocated). The average growth rate in labor earnings (in real terms) was 2.4 percent from 1950-65, 3.1 percent during 1960-65. (See [5], p. 101.) Thus, the use of a 3 percent rate to discount future earnings of the Corpsmen is reasonable, but see pp. 39-42.

months pertain to the recent record achieved by the Corps.[5]

The benefit/cost ratios given on row 3 of Panel C (for five months and a 3 percent rate), are the ratios believed to measure most accurately the recent past performance of Job Corps. The lowest ratio on this line--chosen to make the most conservative estimate--is 1.02 ($3,583 divided by $3,508). The earnings improvement for which the present value is $3,583 is based on a .9 year's gain in educational achievement, which is attributed to a five-month stay in Job Corps. (This is simply 5/9 of the 1.625 years' gain achieved by a nine-month stay. The assumption of linearity in the relation between duration and educational gain is discussed below.) The gain is assumed, therefore, to raise the educational achievement of the average Corpsman from six years of schooling to 6.9 years, since the average base level of education was assumed to be six years in this particular comparison. The earnings improvement associated with this increase in education is estimated on the basis of the earnings of white and nonwhite young men whose education varied over this narrow range. These assumptions produced the lowest value of earnings benefits among those using proportional gains in education and a 3 percent "discount" rate, or, more accurately, a 5 percent discount rate and a 2 percent growth rate in earnings.

The assumption that a Corpsman learns at a constant rate over his

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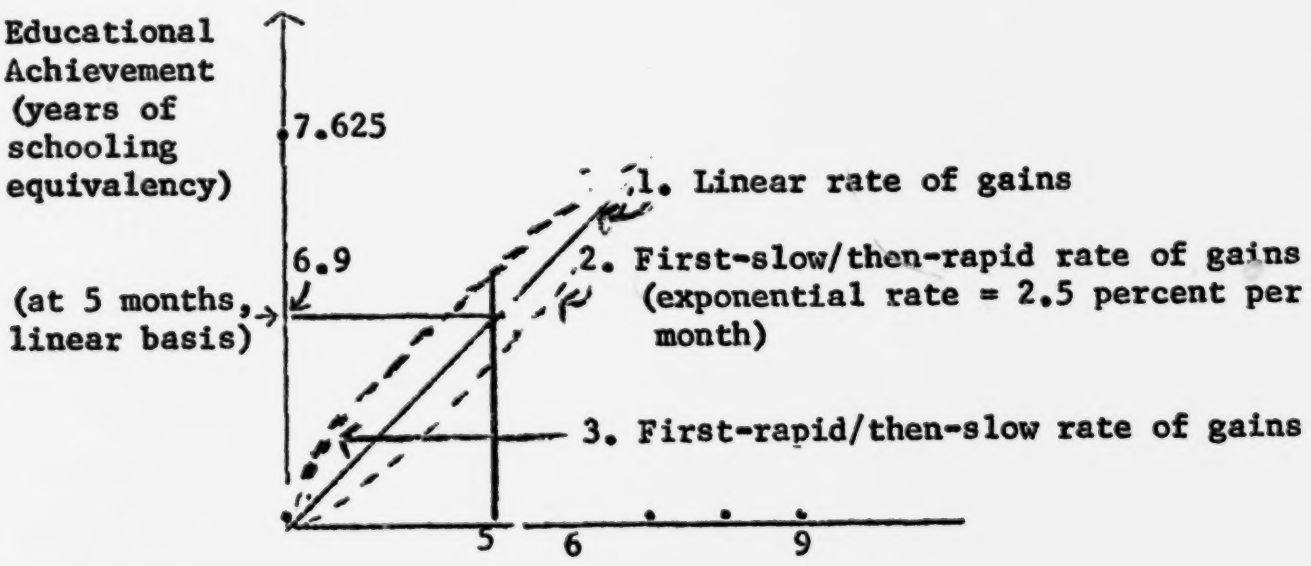
[5]Note that not all possible ratios are listed in Panel C. In particular, no ratios for six months are listed in the top section of Panel C. These would fall between those for five months and nine months and would add little to our understanding. The educational gains, and hence the earnings, attributable to a nine-month stay are the same with a linear or an exponential rate of gain, since both methods lead to a 1.625 years' gain in nine months. The benefit/cost ratios for nine months would, of course, be the same in the bottom section of Panel C as in the top section.

entire stay in Job Corps is, of course, merely a simplifying assumption. If the gain is slower in the early months, then the five-month stayers would have progressed less than proportionally compared to the nine-month stayers. (See the dotted line 2 in the graph below.) The gains attributed to the average Job Corps experience, which is five months, would be somewhat overstated. The reverse is true if the rate of educational achievement starts out rapidly and tapers off in the final months. (See the jagged line 3 in the graph.)

FIGURE 1

Representative Relations Between
Educational Achievement and Months in Job Corps



The lower sections of Panels B and C show the benefit values and benefit/cost ratios, respectively, when using an exponential rate (or constant percentage rate)of educational achievement--in particular, a rate that starts out slowly and rises rapidly in the final months. These benefit/cost ratios are lower, but note that the two ratios

suggested as reasonable and conservative--those for 3 percent, five months, and gains over the 6-8 grade level interval--are .97 and 1.16.

Although the most realistic benefit/cost ratios computed in this study are at least .97, and are more likely to be around 1.22, we should not forget that these benefit figures have been computed using only the earnings gains to the Corpsmen which are consequent upon his increased educational achievement. Are there other factors, not directly computable, that are likely to raise the benefits significantly? A strong presumption is that the answer to this question is affirmative. Among the excluded factors are:

1. Gains due to vocational training. The other mode of computation, based on wage gains found by follow-up surveys of youth who had recently left the Corps, gives a benefit/cost estimate that combines basic educational and vocational training, and this ratio is substantially greater than unity--1.45 at a 3 percent discount rate. As discussed above, the general method of using wage data is considered less appropriate than the educational gain method because it necessitates estimating lifetime earnings based on an observation at a single date in the first year, but it does include vocational factors excluded from the other method.

2. Gains due to "socialization"--the ability to get along in a non-poverty milieu which may be extremely important in job-holding.

3. Gains due to increased family stability, which may contribute significantly to ending permanently family poverty. These gains may be more important for Job Corps women than the increased earnings.

4. Other intergenerational benefits, such as the established tendency for educational gains of parents to lead to increases in educa-

tional attainment among their children, and for traits of stable family relationships to be similarly transmitted.

5. Other savings on social costs of crime, welfare, etc. There is some tendency in popular discussion to put these at the center of benefits. This is overstating their importance because, although the costs of crime and welfare are high, by no means all non-Corpsmen will run into this sort of difficulty during their lifetime (and those who do will not spend their lifetime in jail or on the assistance rolls); nor will all Corpsmen stay out of trouble. Nonetheless, some gains would be derived from this source.

These factors, added up, seem very likely to push the benefit/cost ratios even higher. When the index of white/Southern educational gains is used, and this is probably a better one (for reasons discussed above), the benefit/cost ratios are further increased. Finally, to the extent that Job Corps can lengthen the average stay from five months (and the currently decreasing dropout rates indicate that this is happening), the benefit/cost ratios will creep still higher. Utilization rates at the Job Corps centers will rise, and economies will be achieved as the fixed costs are spread over larger numbers of Corpsmen. The 1.02 ratio would become 1.14 with an average nine-month stay; the 1.22 would become 1.36; and the ratios based on "slow-starting"educational gains would reach exactly these same high values.

It is instructive to compare the benefit/cost ratios reported here for Job Corps to those of several water resource projects which the Army Corps of Engineers has recently advanced. The comparison, which takes into account two important differences in computing benefits, is

shown in Table 1A below. Column II lists the B/C ratios when the same low

TABLE 1A

Comparison of B/C Ratios:
Job Corps and Selected Water Resource Projects

Project	B/C Ratios Using the same Interest Rate (3 1/8%)	B/C Ratios in II Including Indirect Benefits
I	II	III
Job Corps*	1.9	2.1
Upper Missouri-Yankton Navy Project	1.5	1.5
Lake Erie-Ohio River Project	1.3	1.3
Red River-below-Denison Project	1.3	1.3

*The benefit and cost amounts worked with were those using the white/South index for the five-month stayers whose educational attainment progressed linearly. The previous calculation of this B/C was 1.18. The 3 1/8 percent discount factor used above in column II was, like the previous calculations, combined with an earnings growth factor of 2 percent. For column III the indirect and nonearnings benefits of the Job Corps experience are assumed to add 10 percent to the earnings benefits. See pages 15-16 for a listing of the sources of these benefits.

discount rate (of 3 1/8 percent) is used.[6] The third column lists the ratios after adjusting the Job Corps benefits by the second important difference in computation procedures--the inclusion of secondary or indirect benefits. The ratios for the water resource projects in column II already have these

[6]To eliminate a possible source of confusion, it should be noted that the growth rate factor, which reduces the discount rate for Job Corps projects by 2 percent, would generally apply to any investment in human labor resources because of the "guaranteed" rise in the "price of labor" (in real terms) over time. No such argument applies to the prices of the products of water resource projects, and no growth rate is warranted. Indeed, some of the agricultural products produced have experienced falling real prices.

types of benefits included so they remain the same in column III. The secondary benefits of educational programs may amount to at least 15 percent of the wage benefits. (See [8], Chapter IV.) To be on the safe side, the benefits of the Job Corps were increased by only 10 percent. It is worth noting that the secondary benefits of water resource projects sometimes make up a sizable proportion (80 percent or more) of the total benefits calculated by the agency conducting the benefit/cost analysis.[7]

III Technical Detail of the Analysis

The basic tabulations of this study are found in Table 1 where estimates of benefits, costs, and benefit/cost ratios are displayed. In this section the sources of these data are cited and the computations underlying Table 1 are explained. Some comments on the quality of the data on educational and wage gains are also included.

A. Cost Data in Panel A of Table 1

The following sections (a - f) refer to footnotes of Table 1, Panel A.

a) Reported Statutory Costs. "Statutory costs" is a term taken from the appropriations bills passed by Congress and refers to center operating costs which exclude capital expenditures. Table 2, which was obtained from the Job Corps administration, shows $7,142 as the average statutory costs for a man-year in Job Corps. Other figures in the Table

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[7] A critical discussion of the procedures for computing secondary benefits, especially the practices of water resource evaluators, is given in [9], especially Chapter 9.

TABLE 2[a]

Man-Year Costs of Job Corps Center Operations:
Cost-Estimates through 1967

Type of Center	Job Corps Center Operations--Man-Year (M/Y) Costs-Estimates through Jan. 31, 1967: Estimate of M/Y Costs	Center Man/Months (M/M) 7-1-66 to 1-31-67	Type of Center and M/M as percent of Total M/M	Weights I x III
	I	II	III	
Federal Conservation Centers	$6,016*	85,231	45.3	$2,725
State Conservation Centers	5,088	1,621	.9	46
Men's Urban	7,956	83,569	44.3	3,525
Women's Urban	8,904	17,889	9.5	846
		188,310	100.0	$7,142

*Center Operating, $4,471, plus Allowance and Transportation, $1,545.

[a]Office of Economic Opportunity, Job Corps, Financial Management Division (Washington, D.C.).

indicate the variation in average per Corpsman costs among different types of centers, but these will not be used in this paper.

The costs of a man-year may be divided into the conventional categories of variable costs and fixed costs. Variable costs are direcly related to the number of Corpsmen and to the duration of their stay in Job Corps. The costs of food, clothing, and allowances are obvious examples of variable costs. The precise definition of variable costs used in this study is "allowance paid to the Corpsmen and their families" plus "enrollee expenses," and these are listed in Table 3.

Fixed costs are those that are paid out regardless of the number of Corpsmen man-months involved, and in this study are defined simply as the residual difference between total costs and variable costs. They include such items as the costs of center maintenance and the salaries and expenses of the administrative and instructional personnel. Considering fixed costs as the "all other," residual category undoubtedly overstates fixed costs, but as explained below, the results are more conservative (i.e., the cost estimates are higher). Despite the exclusion of capital costs from the fixed costs components of statutory costs, they are a large fraction (64 percent) of total costs.

Fixed costs will be high when the Job Corps centers are operating below capacity. It is reasonable to assume that capacity utilization is directly related to the average length of the enrollees' stay in Job Corps. For a given flow rate into the centers, high dropout rates will lower the utilization rate. (It should be noted, however, that Job Corps officials have been successful in increasing the entering flow rate in the face of shorter-than-expected durations of stay.)

TABLE 3[a]

Job Corps Computation of Unit Costs by Cost Category,
Fiscal 1967 through February 28, 1967
(Centers in Operation Longer than 9 Months)

Comparative Unit Cost Per Man-Year		
Cost Category		Job Corps Average
Enrollee Expense		
1. Clothing		$ 269
2. Subsistence		441
3. Medical and Dental Supplies and Services		262
4. Educational Supplies, Materials, and Services		70
5. Vocational Supplies, Materials, and Services		174
6. Morale, Recreation, and Welfare		104
	Subtotal	1,320
7. Allowances and Allotments		1,200
	Total	2,520

[a]Office of Economic Opportunity, Job Corps, Financial Management Division (Washington, D.C.).

No special adjustment to allow for capacity utilization is required for variable costs. By definition, annual variable costs are reduced proportionately as the utilization rate declines--by 25 percent, 50 percent, and 58.3 percent for nine months, six months, and five months, respectively. As shown in Table 3 variable costs equal $2,520 per Corpsman. All other costs are considered fixed costs.

Fixed costs per Corpsman equal $4,622 (which is total costs, $7,142, minus variable costs, $2,520). Adjustment of these costs to take account of under-utilization of capacity involves the following calculations: The rate of capacity utilization in Job Corps has been about 90 percent during 1966, and has been running even higher during 1967. According to recent data the average duration in Job Corps for an enrollee is about six months. If we assume that a twelve-month average stay indicates 100 percent utilization, then simple interpolation between this and the six months/90 percent rate gives a 95 percent rate of utilization for an average stay of nine months and 88 percent for a five-month average. Since fixed costs are payable regardless of the rate of utilization, we cannot reduce the annual per-Corpsman fixed costs in strict proportion to the ratio of the average duration of stay. For example, we cannot reduce the annual per-Corpsman fixed costs by half when the average stay of the Corpsmen is six months. Instead, we reduce the fixed costs by only 90 percent of one-half (i.e., 90 X .50 = 45 percent), since a six-month stay is associated with a 90 percent rate of capacity utilization. Thus, the reduction factors to apply to fixed costs for periods of less than three months are determined as follows:

for 9 months: (.95) (.25) = .2375

for 6 months: (.90) (.50) = .4500

for 5 months: (.88) (.58333) = .5133

On the basis of the foregoing discussion of fixed and variable costs, the two cost components of the reported statutory costs shown in column I of Table 1 may be combined for periods of less than twelve months according to the following formulas:

for 9 months: $7,142-(.25) (2520)-(.2375) (4622) = $5,414

for 6 months: $7,142-(.50) (2520)-(.45) (4622) = $3,802

for 5 months: $7,142-(.5833) (2520)-(.5133) (4622) = $3,300

b) Capital Costs. The capital investment costs of Job Corps through December 31, 1966, were $135,614,000. The depreciation costs plus costs of foregone interest earnings on this amount are shown below in Table 4. The footnote to the table denoted by an asterisk gives the figures used in Table 1 in the text.

c) Administrative Costs. The following items are included in the administrative costs of Job Corps that are not charged to the centers: enrollee recruitment, screening, placement, payroll administration, Job Corps central headquarters expenses, regional headquarters expenses. For twelve months these costs are $603 per enrollee. Estimates for periods of less than twelve months are reduced according to the formulas used to allocate the fixed costs discussed in section a .

d) Transfer Payments. Transfer payments include clothing, sub-

Table 4 [a]

Job Corps Capital Investment to December 31, 1966
(for centers open more than 9 months)

	Type of Centers			Total	
	Men's Urban	Women's Urban	Conservation		
Construction plus Rehabilitation ($ 000)	$27,848	$3,926	$68,480	$100,254	(A)
Life of item (years)	20	7	15	-----	
Straight-line depreciation per year	1,392	561	4,565	6,518	(B)
Accountable equipment ($ 000)	13,363	3,101	17,691	35,360	(C)
Life of item (years)	8	8	8	-----	
Straight-line depreciation per year				4,420	(D)
Total Capital Investment Costs ($ 000) (A)+(C)				135,614	
Cost of capital at 5 percent ($ 000)				6,781	(E)
Straight-line depreciation of total (B)+(D) ($ 000)				10,938	(F)
Depreciation plus capital cost per year (E)+(F) ($ 000)				17,719*	

[a]Office of Economic Opportunity, Job Corps, Financial Management Division (Washington, D.C.).

*Total man-years in Job Corps for the year ending April 1, 1967 = 25,348. (Approximate: see Table 5 for computations leading to this figure.) Average capital cost per man-year = $17,719,000/25,384 = $698. The average capital cost is allocated to the different durations in Job Corps (9, 6, and 5 months) according to the formulas used to allocate the fixed costs discussed in footnote a.

SOURCE: Adapted from Job Corps Monthly Center Cost Reports: special property study and agency accounting records.

Table 5[a]

Approximate Number of Corpsmen Man-Years
for Year Ending April 1, 1967

Type of Center I	Reported Man-Years for 9 Months II	Man-Years on a 12-Month Basis (II x 1.333)
Men's Urban	8,310.0	11,077
Women's Urban	1,378.0	1,836
Conservation	9,355.7	12,471
Total		25,384

[a]Office of Economic Opportunity, Job Corps, Financial Management Division (Washington, D.C.).

SOURCE: Summaries for centers open More than 9 Months

sistence (food), and allowances. As shown in Table 3, these cost items for twelve months are: $269 + $441 + $1,220 = $1,930. Estimates for periods less than twelve months are derived by proportionate reductions.

e) Foregone Earnings of the Corpsmen. The estimate for foregone earnings is based on a combination of two wage measures: first, a wage of $1.17 an hour in the pre-Job Corps period for the samples of Corpsmen and "No-Shows" surveyed by Louis Harris, Inc.; second, the wages that were reported by the "No-Shows" in the months following their decision not to go into Job Corps. With these data, the average wage increase per month is estimated to be 2 cents per hour, and an average wage for twelve, nine, six and five months was obtained (see Table 6 below).

Table 6

Basis for Estimating Foregone Earnings
for Corpsmen while Enrolled in Job Corps

1. The pre-Job Corps median wage reported in surveys by Louis Harris, Inc., was $1.17 for all persons--graduates, drop-outs, discharged persons, and "No-Shows."

2. The median wage reported by all "No-Shows" after an average lapse of sixteen months since their decision not to enter Job Corps was $1.42.

3. The median wage reported by late "No-Shows" after an average lapse of seven months since their decision not to enter Job Corps was $1.31.

4. The wages reported in items 1 and 3 indicate the average gain in wages is 2 cents per hour per month.

5. The reported rate of "non-working"--approximately 40 percent--is equivalent to working an average of twenty-four hours a week (out of forty hours).

Items 4 and 5 lead to the following tabulations:

Months in Job Corps	Starting Wage	Predicted Ending Wage	Average Wage*	Average Weekly Wage (for 24 hours)	Average Total Earnings**
12	$1.17	$1.41	$1.29	$30.96	$1,610
9	1.17	1.35	1.26	30.24	1,179
6	1.17	1.29	1.23	29.52	768
5	1.17	1.27	1.22	29.28	644

*To derive the average, a straight-line interpolation was made between the starting and ending wages.

**The average total earnings are estimates of what the average Corpsman could have earned during the time he spent in Job Corps had he not entered Job Corps.

An average rate of unemployment (or, technically, a "not-working rate") of 40 percent was assumed (which is equivalent to working an average of 24 hours a week out of 40 hours). The unemployment rate reported among the Corpsmen before Job Corps was 42 percent. The unemployment rate among "No-Shows" in the post-Job Corps period, at the time of the interview in January-February 1967, was 40 percent, and among ex-Corpsmen the unemployment rate in February was 36 percent.

f) Value of Work Projects. The appraised value of the work projects in conservation centers is $1,665 per man-year. Since about 38 percent of the Corpsmen were at conservation centers during the recent period, the value of the work projects distributed across all Corpsmen is $633 for a twelve-month period. For periods of less than twelve months, a proportionate reduction was used. It is worth noting that the implicit wage earned by the Corpsmen on these projects was only 80 cents an hour. Therefore, it is unlikely that the value of the work projects is overstated.

B. Benefits Data in Panel B of Table 1

All the benefit calculations using educational data are based on data for males only. One justification for this simplification is that males accounted for over 90 percent of the Corpsmen man-months in the period analyzed in this study, and for 95 percent of the respondents in the Harris surveys. The assumption that the educational gains are the same for women as for men is reasonable, although the translation to wage gains is somewhat ambiguous. On the one hand, the levels of earnings

for working women are lower than those for men. On the other hand, the educational (and vocational) training may encourage the women to work more and this leads to relatively higher earnings for those who were trained. But this overstates the benefits to the extent that more work really means more market work and less home work. The earnings ability of the women in Job Corps may be increased substantially in a relative sense but it is difficult to interpret this, given the variations in the meaning of work for women.

The following sections (g - m) refer to footnotes of Table I, Panel B.

g) Educational Gains. Estimating the increase in earnings that results from additional years of schooling is an exceedingly complex task. Simply to show the statistical association between education and earnings at a moment in time is difficult because of the many intervening variables which need to be "held constant." Drawing inferences for the population on the basis of the sample evidence, which is the next step, is seriously hindered by the lack of experimental controls over the administration of "treatments" (that is, education) and the operation of "effects" (that is, earnings). Finally, the projection years hence of an education-earnings relation detected at one point in time--the assumption that the quantitative effects observed now will similarly hold in the future--is hazardous.

We believe, however, that previous studies have made sufficient progress in overcoming these difficulties to permit reasonably accurate estimates of the effects of educational attainment on earnings and

employment in the labor market. The most recent and most thorough study is by Giora Hanoch [2].

The data source for Hanoch's study was the huge 1-in-1,000 sample of the 1960 Census, from which Hanoch extracted 57,000 "observations" (i.e., records of this many males). Briefly, the technique used by Hanoch involved measuring the earnings-education relationship for 28 groups of males (white, nonwhite, North, South, and seven age groups). Other variables controlled were the following: (a) age (i.e., age variation within the age groups), (b) type of residence (urban, rural, etc.), (c) size of place of residence, (d) size of family, (e) presence of children, (f) mobility status, (g) marital status, (h) living alone, (i) foreign born, and (j) Southern born. For more details about the definitions of the variables used in the analysis and about the statistical procedures used, the interested reader is urged to examine Hanoch's study. The important point to be indicated here is that the analysis was a careful application of modern econometric techniques. Although there are a number of reasons why the estimated effect of education on earnings made by Hanoch may be biased, and anyone is free to speculate whether the upward biases do or do not cancel the downward biases, the results Hanoch obtained do give a reasonable basis for determining the gain in earnings that could be expected as a consequence of the gain in educational attainment achieved in Job Corps. See Table 7 for the basic age-education-earnings relations taken from Hanoch's thesis which are used in this paper.

h) <u>"White/South Index" and "Total Index."</u> One set of tabulations in Hanoch's study consisted of four age-earnings profiles, one

Table 7

Basic Data for Estimating the Present Value of the Increase in Earnings from Increased Educational Attainment[1]

PANEL A: AGE-EARNINGS PROFILES

Age[2] (1)	Net Earnings Differentials in 1959 of Males with 6th, 8th, and 10th Grade Schooling, by Age, Color, and Region[3]							
	Whites in South		Whites in North		Nonwhites in South		Nonwhites in North	
	8-6[4]	10-8[4]	8-6	10-8	8-6	10-8	8-6	10-8
16	$-27[5]	---	91	---	-194[5]	---	-591[5]	---
18	-31	225	101	132	-216	150	-692	111
20	-31	229	103	135	-221	153	-752	140
22	83	224	170	218	-134	138	-646	207
24	197 *	218 *	237 *	301 *	-46 *	122 *	-537 *	271 *
27	367	211	338	426	84	99	-374	368
32	481	367	430	562	236	56	-183	452
37	339	776	412	589	289	7	-113	421
42	264	916	430	579	293	-34	-36	343
47	292	622	501	511	228	-63	50	196
52	385	428	506	561	269	-52	333	-120
57	573	375	414	786	474	16	911	-690
62	627	297	342	857	522	-2	1050	-743
67	185	185	299	697	335	-151	533	25

* The following figures show the actual estimated earnings given in Hanoch's study for 24-year-olds (as an illustration), which lead to the differentials tabulated:

Grades Completed	Whites in South	Whites in North	Nonwhites in South	Nonwhites in North
6th	$2,125	$2,610	$1,520	$2,483
8th	2,322	2,847	1,474	1,946
10th	2,540	3,148	1,596	2,217

Thus, the difference between 8th and 6th grade completers who are white Southerners is: 2,322 - 2,125 = 197.

NOTE: Footnotes to this table are given on the next page.

Table 7 (Continued)

PANEL B: PRESENT VALUES OF INCREASES IN EARNINGS SHOWN IN PANEL A FOR WHITE SOUTHERNERS AND FOR TOTAL				
Discount Rate (percent)	White/South		Total (unweighted average of four region-color groups)	
	6-8	8-10	6-8	8-10
1-1/8[6]	$11,989		11,042	
3	7,757	10,763	6,249	7,639
5	5,008	7,225	3,842	5,270

Footnotes to Table 7, Panel A:

[1]Source: [2], pp. 55-57.

[2]The age listed in column (1) is the exact age at which the earnings were estimated. Earnings for all other ages were derived by simple interpolation. The present value of the earnings amount received at each age was then computed and summed.

[3]The earnings differentials are shown for age, education, color, and region groups, and have been estimated holding constant (for "net of") the influence of: (a) age (by finer measures), (b) type of residence (urban, rural, etc.), (c) size of place of residence, (d) size of family, (e) presence of children, (f) mobility status, (g) marital status, (h) living alone, (i) foreign born, and (j) Southern born.

[4]Actual grade levels were 5-7 (instead of 6) and 9-11 (instead of 10).

[5]All negative amounts in Panel A were changed to zero before computing the present values of the increased earnings from education. Negative sums mean that for the age groups involved those with less education were making more than those with more education. There are several reasons for these anomalies--reasons that justify the procedure of substituting zero amounts for the negative amounts. In some instances, particularly at the youngest ages, a negative amount reflects the part-year earnings of the higher-educated person which are due to leaving school during the year for which income is reported. Secondly, for young age groups, there may be some premium paid for the greater employment experience of the less-educated person (who has left school earlier and worked longer). Finally, among older groups of nonwhites the anomaly may result from the combination of sampling variability, errors in reporting and a low correlation between education achievement and years of schooling completed. There may be instances, for example, in which a highly intelligent Negro recognizes that the school he attends is so bad that he is better off dropping out and working.

Since none of the reasons above are relevant to the education achievement in Job Corps, there is no justification for using the negative amounts. Note that the use of zero amounts itself undoubtedly understates the earnings increases stemming from educational advances. Each time a zero is included, and for nonwhites in the North there are zeros for 24 years in the 8-6 comparison, we are assuming that no increase in earnings follows from an advance in education.

[6]The lowest rate of 1-1/8 percent was used for calculating the benefit/cost ratios that were compared with water resource projects. (see Table 1A on page 17).

each for white and nonwhite males living in the South and in the North. Within each color-region group the age-earning profile was shown for eight educational levels. The years-of-schooling categories range from 0-4 years to 17 years or more.

With these data we can determine the differences in lifetime earnings of, for example, white males living in the North with five to seven years of schooling completed compared with those with eight years of schooling completed. Let us examine the question of which region-color groups would best represent the Job Corps population.

The young men in the Job Corps are drawn from all over the country, although there is a slight overrepresentation of the South, which reflects the higher incidence of poverty in that region. The proportion nonwhite in the Corps has fluctuated around 40 or 50 percent during the past year, and 50 percent was assumed for calculations in this study. A simple unweighted average of the earnings gains from the selected educational levels across all four region-color groups gives us estimates that reflect the actual Job Corps population. This average is called the "Total Index."

Note that the Total Index gives a weight of 50 percent to the education-earnings estimates for nonwhites, even though the sample was only 10 percent as large as the white sample (since 10 percent is the population proportion of nonwhites). The relatively small sample size for the nonwhite estimates is one drawback to the Total Index. Indeed, the conclusion reached by Hanoch in his study was that the nonwhite figures were unreliable for a number of subgroups because of several factors, including the smaller sample size, but also, and probably more importantly, because of greater response errors in the information on education and earnings.

Another reason the nonwhite data are unsatisfactory for estimating an education-earnings relation is the likelihood that years-of-schooling completed is a weak measure of actual educational attainment because of the great variability in quality of nonwhite schooling. By contrast, the measure of years-of-schooling equivalency for the educational gains achieved in Job Corps is based on the hard evidence of actual tests. We would like to know the relation between actual educational achievement and earnings. But because years-of-schooling, especially for nonwhites, inaccurately measures educational achievement, we will underestimate its quantitative effect on earnings when using the Total Index.

These shortcomings of the Total Index prompted a search for alternative measures of the education-earnings relation. The second basis for estimating the education-earnings relation was to use the data for white males living in the South, along with a downward adjustment to reflect the combined proportions of Northern whites and nonwhite in Job Corps. (See Table 8.) The use of white data gives us the benefit of a much larger sample size, fewer response errors, and a more accurate estimate of the effect of <u>educational achievement</u> on earnings. The South was chosen to reflect generally lower-paying labor markets (relative to the North) and a lower level of educational achievement for any given level of years of schooling completed (again, relative to the North). Both conditions apply to youth in Job Corps. Evidence for the lag in educational achievement of the South relative to the North, for both whites and nonwhites, is given in the Coleman Report. (See [6], pp. 273-5.) The earnings computed on the basis of the white/South education-earnings relation were reduced by a factor of .964 to reflect the actual region-color composition

Table 8

Procedure for Adjusting the Earnings of White/Southern Males to Represent All Males

I BASIC EARNINGS DATA AS OF 1959

Color and Age Group	Years of School Completed			
	8		9-11	
	North	South	North	South
White, 18-24	2,650	1,984	2,588	2,132
White, 25-64	4,731	3,857	5,341	4,556
Nonwhite, 18-24	2,352	1,171	2,139	1,256
Nonwhite, 25-64	3,802	2,437	4,042	2,587

SOURCE: [7].

Table 8 (Continued)

II EARNINGS OF AGE-COLOR-REGION GROUP AS A RATIO OF THE WHITE/SOUTH GROUP

(Earnings Ratio, with White/South in Denominator)	8 Years Schooling	Averages for All Ages*	9-11 Years Schooling	Averages for All Ages*
North, White, 18-24	1.34	1.28	1.21	1.19
North, White, 25-64	1.23		1.17	
North, Nonwhite, 18-24	1.14	1.11	1.00	.94
North, Nonwhite, 25-64	.99		.89	
South, Nonwhite, 18-24	.59	.61	.59	.58
South, Nonwhite, 25-64	.63		.57	

*The average gives almost equal weight to the age periods 18-24 and 25-64 to reflect the discount rate, which lessens the importance of earnings in the later ages and offsets the larger number of years.

Table 8 (Continued)

III COMPUTATION OF A SINGLE INDEX NUMBER USING THE RATIOS OF STEP II TO ADJUST THE WHITE/SOUTH EARNINGS

Average of ratios of all color-region-education groups, based on the ratios shown in Step II:

$$\frac{\text{8 years measure}}{1.28 + 1.11 + .61 + 1.00^*}{4} = 1.00 \text{ and } \frac{\text{9-11 years measure}}{1.19 + .94 + .58 + 1.00^*}{4} = .9275$$

and averaging over both educational measures we have:

$$\frac{1.00 + .9275}{2} = .964$$

*The ratio of white/South earnings to itself is, of course, unity.

of Job Corps--where, to simplify computations, we use an unweighted average of the four region-color groups as the actual composition. This means, of course, that we assume the Job Corps has 25 percent each Northern nonwhites, Northern whites, Southern nonwhites,and Southern whites. It is likely that the average composition during the past year included more whites and more Northerners than these percentages provide. However, the correction would not make any significant change in the calculation of benefits, and what changes would be made would increase the benefits--owing to a stronger relationship between education and earnings among Northerners and whites (compared to Southerners and nonwhites). This relationship may be vaguely detected in Table 7, although for precise differentials in the discounted values of the earnings differentials, see [2], pages 90-91.

i) Grade Levels, 6-8 and 8-10. The incremental units of educational gains were applied over two intervals of completed years of schooling. The interval labeled "6-8" was between the category five-to-seven years of schooling completed and the category eight years of schooling completed. The second interval, "8-10," was from eight years to the category nine-to-eleven years of schooling completed. The average educational gain, translated into equivalent measures of years of schooling is, therefore, added to a base of either six years or eight years.

The gain of 1.625 years which is achieved during the nine-month stay in Job Corps lifts the schooling of the Corpsmen to 7.625 or to 9.625 years, depending on the base chosen. In percentage terms the

increase of 1.625 years amounts to 81.25 percent (1.625/2.00) of the gain in earnings associated with the intervals six-to-eight or eight-to-ten.

The choice of the intervals six-to-eight and nine-to-ten was recommended by the two grade levels that characterize the entering Corpsmen: (1) an average of nine years of schooling completed; (2) a level of reading and mathematics abilities at about the fifth grade.

If the trait of perserverence and the simple maturation that goes with staying in school longer are the sources of the higher earnings that we see among higher-educated youth (8th grade completers versus 6th, 10th grade completers versus 8th, etc.), then we should use the higher educational interval (8-10) for representing the Job Corps youth, since they have stayed in school nine years. If, on the other hand, the earnings levels associated with different years of schooling reflect primarily educational achievement, then the lower interval (6-8) is appropriate. Our judgment is that the lower interval, 6-8, is a more realistic level over which to apply educational gains and to estimate earnings improvements for the Job Corps youth. Recall that the lower interval gave smaller gains in earnings and lower benefit/cost ratios. The tabulations of lifetime earnings differentials for the different educational groups are shown in Table 7 above.

Our reliance on the conservative estimates of gains from the 6-8 interval points up another reason for selecting the white/South group in the analysis. Individuals who have left school at the 6th grade are apt to be somewhat atypical, particularly those who have left in recent years. Using white Southerners instead of Northerners serves to

minimize this disturbing element in the attempt to represent the Job Corps youth, since leaving school at an early age is more common in the South.

The present values shown in Panel B of Table 7 require three further steps to obtain the present values in Table 1 and 1A.

(1) Each amount was multiplied by 1.27 to allow for the average 27 percent increase in wages and salaries from 1959 to 1966. (See column (1), Table B-30, p. 248, of the Economic Report of the President, 1967.)

(2) Each amount was multiplied by the ratio of educational attainment in Job Corps to the two-year interval of educational increase (between 6 and 8 or 8 and 10). Example: five months in Job Corps is expected to bring about an increase of .903 years of schooling (which is 5/9 of the 1.625 years gain reported for Corpsmen who stay 9 months). This leads to a factor of .4515 (= .903 divided by 2.000), which multiplies the present value sum. For nine months in Job Corps, the factor is .8125 (= 1.525/2.000).

(3) An additional adjustment factor for white/Southern earnings is .964 (see footnote h, page 29, and Table 8).

j) Discount Rates. The interest rate used by government agencies in evaluating many of their investment projects is often between 3 and 4 percent; economists outside the government have more often used rates of 4-6 percent, although some cogent arguments have been made for rates as high as 9-10 percent.[8] The investment in Job

[8] See, as one example, Jack Hirschleifer, "Comments," [10], pp.500-01.

Corps is being evaluated in terms of the improvement in labor productivity of the Corpsmen, and we have argued that the rate used to discount future earnings from labor should allow for the secular (and, I would say, inevitable) growth in wage rates. For example, if earnings received one year hence are discounted by 5 percent but have increased in value by 2 percent, then the appropriate rate for discounting the future earnings is 3 percent.[9]

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[9] In mathematical terms, the general formula for the present value, PV, of an amount received n years hence is:

$$(1)\quad PV = \int_0^n F(t)\, e^{-rt}\, dt$$

where: $F(t)$ = the amount, A, expressed as a function of time, t.
e = the natural number ($e = 2.7128...$) used in compound interest or growth formulas when growth is continuous
r = the interest rate

If the amount, $A = F(t)$, does not itself grow or decline then the discount rate is just the interest rate, r, which is in the exponent of e. If the amount, A, is itself growing in value at the rate, g, then A may be expressed:

$$(2)\quad A_t = A_o\, e^{gt}$$

Then substituting (2) in (1) we have

$$(3)\quad PV = \int_0^n Ae^{(g-r)t}\, dt$$

The discount rate is again given in the exponent of e, and this rate is now g-r. Thus, if the interest rate is 5 percent (or 7 percent) and the growth rate is 2 percent, then the discounting rate is 3 percent (or 5 percent). (See [11], pp. 401-02.

As explained in Part II (p. 16), a growth factor should not be attached to <u>any</u> set of prices measuring the benefits of the investment projects. Aside from the influences of inflation or deflation, product prices may rise or decline over time, and it is difficult to judge the expected long-run trend. As examples, the real prices of cars, TVs, and food have all moved both up and down over different extended periods of years, and it is likely that the secular trend of prices of these commodities (holding quality constant) is downward.

By contrast, when estimating future wages on the basis of current wages, a growth factor generally should be applied to the current wage levels. A secular rise in real wages deserves to be considered a sure bet over the near future in the United States. Rates of growth in output per employee (a measure of real wages) are listed below for several recent periods:

Years	1947-1965	1950-1965	1960-1965
Rate of growth of output per employee	2.5	2.4	3.1

(SOURCE: [5], pp. 101 and 189.)

These growth rates are considerably higher than those that apply to longer time periods. The longest period for which data are available in [5] is 1909-1965, when the growth rate was 1.5 percent. For 1929-1965, the rate was 1.8 percent. However, periods that stretch further back in time are probably less reliable for projecting the near future, particularly since the earliest period includes the years of mass

immigration to the United States and both periods include the catastrophic depression of the 1930s. Neither event is likely to be duplicated in the forseeable future.

If we select a growth rate from the more recent periods shown on page 41, we might settle on 2.5 as an appropriate rate for projecting labor earnings. Using this rate, we need to make an additional adjustment before arriving at the 2 percent rate adopted in the analyses of the text. The need for the adjustment was pointed out by Gary Becker,[10] and it can be explained briefly. The growth rate of real wages is basically a composite of two ingredients: (a) the rise in the price of quality-constant labor (due in large part to a slower growth in the supply of labor than in the demand for labor); and (b) the increase in the quality of labor (due principally to increases in educational attainment). We want to allow for the secular growth stemming only from (a). Becker reduced the earnings growth rate by 25 percent, and I have used a 20 percent reduction factor to derive the growth rate of the price of labor of constant quality.

k) The Relation Between Time in Job Corps and Educational Achievement. The Job Corps research staff is currently checking on how the learning rate of Corpsmen varies for different durations of time in Job Corps, as well as how learning varies among Corpsmen of different ages and types of background. Preliminary results of this investigation indicate that the linear approximation of the relation

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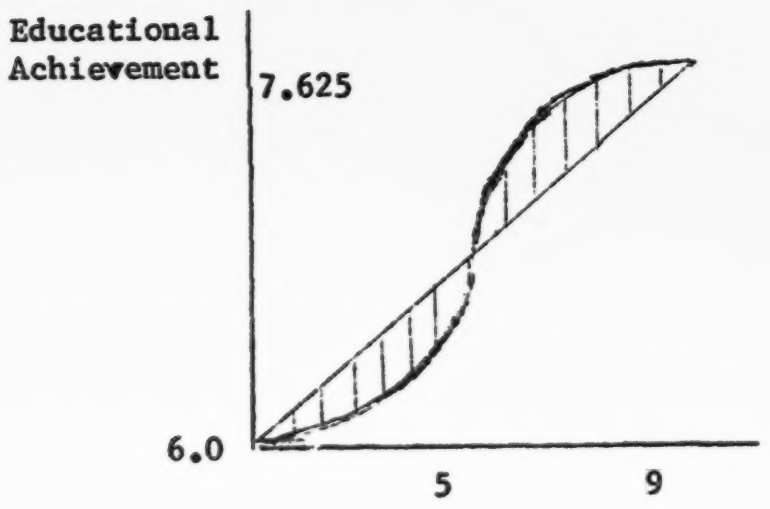
[10] See [12], especially p. 73.

between duration and educational achievement may be adequate for representing the average relation. As the graph on page depicts, the three basic relations are linear, ascending, and descending curves, and all would probably be characteristic of the achievement patterns of some Corpsmen. Averaging these leads to a linear approximation, as does one additional pattern shown below in the graph. Robert Krug, the Job Corps Director of Plans and Evaluation, has suggested that this curve illustrates a common pattern:

FIGURE 2

Relation Between Educational Achievement
and Months in Job Corps Showing Variable Rate of Learning



The heavy line shows a slow rate of gain for the first month or so, and then a rapid rate of gain which begins to taper off shortly after the fifth month, and then grows at a declining rate. The cross-hatched areas are equal as drawn and indicate that the straight line would adequately describe the average relation, if the curve were similar to that in the graph.

1) Wage Gains. The measure of wage gains was derived from the data of two surveys by Louis Harris, Inc., [3, 4]. One survey involved a sample of all types of terminations from Job Corps--graduates and dropouts. The other survey obtained data on "No-Shows." The pre- and post- wage rates of the ex-Corpsmen are determined and the difference is attributable to Job Corps after adjusting for an expected wage increase over the duration of the Job Corps period, using the wage data for the "No-Shows" to make the adjustment. The steps in this procedure are shown in Table 9.

m) Use of the "Late No-Shows" as a Control Group in Measuring Wage Gains. The "Late No-Shows" were selected from all "No-Shows" to act as a control group because it was believed important to keep the time spent in the labor market approximately equal for the control group and the Corpsmen group. The Corpsmen had a potential six to seven months' experience in the labor market, between the time of their termination (August 1966) and the interview (January-February 1967). If we assume the "Late No-Shows" who made their decision not to join Job Corps sometime in 1966 entered the labor market around June or July, then their average exposure to the labor market is seven to eight months. Had all "No-Shows" been used for comparisons, further adjustments in the wages of the Corpsmen would have been required to allow for the extra experience (eight to nine months more than the Corpsmen) of the "No-Shows." This was tried on an experimental basis and the result was to increase the differential in favor of the ex-Corpsmen. Thus, use of the "Late No-Shows" may lead on this account to overly conservative estimates of the wage gains from Job Corps.

Table 9

Derivation of Present Value of Wage Gains Shown in Table 1

PANEL A: WAGE DATA FOR AUGUST 1966 TERMINEES FROM JOB CORPS AND "NO SHOWS" FROM 1966: PRE- AND POST-JOB CORPS EXPERIENCE

	Graduates	Drop-Outs	Late No-Shows
Pre-Job Corps Wage	1.14	1.19	1.17
Wage in February 1967 (six months after leaving Job Corps)	1.48	1.40	1.31
Difference	+.34	+.21	+.14
Net improvement allowing for the expected improvement shown by the "No-Shows"	+.20	+.07	
Weighted average of the improvement (using the proportion of graduates and dropouts as weights)	$0.12		

PANEL B: TRANSLATION OF WAGE GAIN TO ANNUAL AND LIFETIME-PRESENT-VALUE MEASURES

Assumed Unemployment Rate	Equivalent Hours per Week	Annual Earnings Differential (Hours x 12 cents x 52)	Present Value of Earnings Increase for 48 Years Discounted at: 3%	5%
25 percent	30	$187.20	$4,730	$3,384
18 3/4 percent	32.5	202.80	5,124*	3,666*
12 1/2 percent	35	218.40	5,518	3,948
0 percent	40	259.60	6,559	4,693

*Values chosen as most appropriate and entered in Table 1. An unemployment rate of 18 3/4 percent is probably less than that which will apply to the ex-Corpsmen in the first few years after leaving Job Corps, but is probably twice as high as the rate that will apply to the years between the ages of 25 and 50.

SOURCE for Panel A: Surveys by Louis Harris, Inc. [3, 4].

There are, however, three shortcomings in the survey data that may bring about biases that exaggerate the wage gains from Job Corps. The first is that no effort was made to match No-Shows and Corpsmen terminees either at the time of selecting samples or when using the data collected. Thus, we cannot be sure that the "No-Shows" had similar earnings abilities as the Corpsmen when entering Job Corps. The comparisons shown between the two groups in Table 10 reveal differences between the two groups, but it is not clear whether one or the other would be expected to have an advantage in the labor market. For example, the "No-Shows" were less likely to be working before Job Corps, but they have gone further in their schooling.

The second problem is whether the samples are good representations of the populations they are meant to represent. In both surveys the no-response rate was high and there is a danger that the responses among the sampling frame of ex-Corpsmen may have "selected favorably"--that is, that the nonrespondents may have represented a less successful group. This problem may be especially acute because the Harris reports of the characteristics of the sample of ex-Corpsmen have combined movers, nonmovers, and phone-in interviews without testing for differences among the groups or weighting the groups according to their population proportion. The phone-in interviews, in particular, may consist of the more successful Job Corps terminees.

Finally, Professor Sar Levitan has pointed out a bias favoring the Corpsmen as a result of an increase in the Federal minimum wage law, which went into effect on February 1, 1967. Since <u>all</u> ex-Corpsmen were surveyed in February, while only <u>some</u> "No-Shows" were (the remainder

Table 10

Selected Characteristics of August Terminees from the Job Corps Program and "No-Shows"*

Characteristic	Corpsmen (n = 868)	"No-Shows" (n = 517)
Sex: Percent male	95	87
Age: Percent younger than 18	23	21
18-19	45	41
20 and over	32	38
Race: Percent Negro	54	61
Median years of Education	8.9	9.4
Status before Job Corps:		
Percent in school	10	11
Percent working	58	30
Percent unemployed**	32	58
Percent other	--	2
Median Hourly Wage of those Working (when deciding about entering Job Corps)	$1.17	$1.17

*Note: Characteristics for the "No-Shows" apply to all "No-Shows," whereas only the "Late No-Shows" (n = 233) were used for wage comparisons in Part I.

**Note: Probably includes those "not in the labor force and not in school."

SOURCE: [3, 4].

were surveyed in January), some of the wage gains of the Corpsmen may stem from higher wages paid in February compared to January. To check on this effect, further investigation of the dates of the survey interviews of the "Late No-Shows" and the extent to which wage differentials are traceable to the minimum wage law will be made.

APPENDIX

An Explanation for Excluding Transfer Payments from Net Costs

Three key concepts in our view toward transfer payments are: first, that the entire population of the United States is considered as a unit for which we are trying to maximize benefits--we are all "one big family"; second, that each person's satisfaction from income is considered the same, so that any transfer from one to another involves offsetting losses and gains; third, that the expenditures and resources of a program may pay for consumption (e.g., the Corpsmen's meals) which generally would have occurred in the absence of the program, and for investment (e.g., training facilities) which measures the resources given up (not consumed now) in the hope of earning a return that will make possible deferred consumption.

These concepts lead to excluding transfer payments from the calculation of benefits and costs of an investment program. The second point can be reworded to express the rationale most directly: the dollars given up by the taxpayer are offset to the extent that the dollars (or good bought with dollars) are given to Corpsmen. But not all dollars buy goods (like food and clothing) for the Corpsmen, and the third point seeks to distinguish the investment component, which pays for items like the training facilities. Although we may reasonably assume that the food and clothing confer benefits to the Corpsmen, the investment component must be tested to determine the payoff of the program and to answer the question: What is the rate of return or present capital value of the investment?

Many of us may feel that transfer payments could add more to benefits than are subtracted from costs; that, for example, the loss to the relatively affluent taxpayer has less weight than the gain to the relatively poor Corpsman and his family. This judgment is not expressed in the calculation of the benefits and costs of this study precisely because the focus is on the efficiency criterion of the investment, clear of such equity considerations.

LIST OF REFERENCES

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